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EXAMINER	
NGUYEN, LUONG TRUNG	
ART UNIT	**PAPER NUMBER**
2622	

DATE MAILED: 05/04/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/654,922	YADID-PECHT ET AL.	
	Examiner	Art Unit	
	LUONG T. NGUYEN	2622	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 February 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *2-13 and 15-24* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *2-13,15-24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *2/13/06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. It is noted that Art Unit 2612 has been changed to Art Unit 2622.

Response to Arguments

2. Applicant's arguments with respect to claims 2-9, 20-24, filed on 2/13/2006 have been fully considered but they are not persuasive.

3. Applicant's arguments with respect to claims 10-13, 15-19, filed on 2/13/2006 have been considered but are moot in view of the new ground(s) of rejection.

4. Applicant's arguments, see Amendment, filed on 2/13/2006, with respect to the rejection(s) of claim 15 under 35 U.S.C. 103(a) as being unpatentable over Koch et al. (US 4,589,024) in view of Morimura (US 5,455,621) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Koch et al. and Komiya et al. (US 5,264,940).

In re page 11, Applicants argue that both Claims 2 and 3 recite "resetting each pixel after each readout of the pixel." Hence, after each readout, the pixel starts a new and begin to accumulate charge. In contrast, Komiya teaches in FIG. 21 that a CCD sensor is NOT reset after the integration time t1 and continues to accumulate charge at the end of the integration time t1 until the end of the integration time t2. In fact, this part of Komiya teaches away from Claims 2 and 3 in this regard.

In response, regarding claims 2 and 3, Applicants amended both claims with limitation "resetting each pixel after each readout of the pixel." The Examiner considers that claims 2 and 3 as amended still do not distinguish from Komiya et al. Komiya et al. discloses that after reading out signal at the end of period of time t2, a pixel is reset (Figure 21, Column 15, Lines 4-6). Noted that claims 2 and 3 do not require "resetting each pixel after read out of the pixel at the end time of first shorter integration time and at the end time of second longer integration time." Therefore, the applicants' argument that "Komiya teaches in FIG. 21 that a CCD sensor is NOT reset after the integration time t1 and continues to accumulate charge at the end of the integration time t1 until the end of the integration time t2" is not relevant.

In re pages 12-13, Applicants argue that Komiya teaches away from the feature "resetting each pixel after each readout of the pixel."

In response, regarding claim 4, Applicants amended claim 4 with limitation "resetting each pixel after each readout of the pixel." The Examiner considers that claim 4 as amended still do not distinguish from Komiya et al. in view of Koch et al.. Komiya et al. discloses that after reading out signal at time t2, a pixel is reset (Figure 1, Column 15, Lines 4-6). Noted that claim 4 does not require "resetting each pixel after read out of the pixel at the end time of first shorter integration time and at the end time of second longer integration time."

In re page 13, Applicants argue that Koch fails to teach two different integration times for each pixel in a single frame readout.

In response, regarding claim 4, Applicants amended claim 4 with limitation "in each frame readout, reading out each of the pixels at least at both of a first shorter integration, which

begins at said first time, and ends at a second time and a second longer integration time, which begins at said first time and ends at a third time subsequent to said second time." The Examiner considers that claim 4 as amended still do not distinguish from Komiya et al. in view of Koch et al.. Komiya et al. discloses in each frame readout, reading out each of the pixels at least at both of a first shorter integration time (period of time t1, Figure 21), which begins at said first time, and ends at a second time (READ, Figure 21) and a second longer integration time (period of time t1 + t2), which begins at said first time, and ends at a third time (READ/RST, Figure 21) which subsequent to said second time (Column 14, Line 46 through Column 15, Line 17).

In re page 14, Applicants argue that Komiya teaches away from the resetting feature in claim 20 as amended. Hence, the combined teaching of Morimura and Komiya as suggested by the Office Action fails to teach the combination of claim 20.

In response, regarding claim 20, Applicants amended claim 20 with limitation "wherein the readout control part is configured to reset each pixel after each readout of the pixel." The Examiner considers that claim 20 as amended still do not distinguish from Morimura in view of Komiya et al.. Komiya et al. discloses that after reading out signal at the end of period of time t2, a pixel is reset (Figure 21, Column 15, Lines 4-6). Noted that claims 2 and 3 do not require "resetting each pixel after read out of the pixel at the end time of first integration time and at the end time of second integration time."

Claim Objections

5. Claim 2 is objected to because of the following informalities:

Claim 2 (line 11), "resetting reach pixel" should be changed to --resetting each pixel--.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 2, 3 are rejected under 35 U.S.C. 102(b) as being anticipated by Komiya et al. (US 5,264,940).

Regarding claims 2 and 3, Komiya et al. discloses a method comprising:

forming a two-dimensional array of pixels (solid-state imaging device or CMD, Column 14, Lines 46-51);

allowing the pixels to receive light representing an image to be detected by allowing the pixels to accumulate light beginning at a first time (at time "0", reset (RST on the time axis) is carried out to start accumulation of charges, Figure 21, Column 14, Lines 45-68);

in each frame readout, reading out each of the pixels at least at both of a first shorter integration time (period of time t1, Figure 21), which begins at said first time, and ends at a second time (READ, Figure 21) and a second longer integration time (period of time t1 + t2), which begins at said first time, and ends at a third time (READ/RST, Figure 21) which subsequent to said second time (Column 14, Line 46 through Column 15, Line 17);

resetting each pixel after each readout of the pixel (Komiya et al. discloses that after reading out signal at the end of period of time t2, a pixel is reset, Figure 21, Column 15, Lines 4-6);

processing information from the readouts to combine portions of information from the first shorter integration time with information from the readouts from the second longer integration time, to form a composite readout (Column 15, Lines 1-5).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. Claims 4-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Komiya et al. (US 5,264,940) in view of Koch et al. (US 4,589,024).

Regarding claim 4, Komiya et al. discloses a method comprising:

forming a two-dimensional array of pixels (solid-state imaging device or CMD, Column14, Lines 46-51);

allowing the pixels to receive light representing an image to be detected by allowing the pixels to accumulate light beginning at a first time (at time "0", reset (RST on the time axis) is carried out to start accumulation of charges, Figure 21, Column 14, Lines 45-68);

in each frame readout, reading out each of the pixels at least at both of a first shorter integration time (period of time t1, Figure 21), which begins at said first time, and ends at a

second time (READ, Figure 21) and a second longer integration time (period of time t1 + t2), which begins at said first time, and ends at a third time (READ/RST, Figure 21) which subsequent to said second time (Column 14, Line 46 through Column 15, Line 17);

resetting each pixel after each readout of the pixel (Komiya et al. discloses that after reading out signal at the end of period time t2, a pixel is reset, Figure 21, Column 15, Lines 4-6);

Komiya et al. fails to specifically disclose wherein said reading out comprises reading out first row of pixels representing said first shorter integration time and a second row of pixels representing said second longer integration time. However, Koch et al. teaches a two-dimensional image sensor with regulated integration time in which the readout operation is repeated row by row, within the row duration tzz (Column 4, Lines 43-66), and the length of the integration time tI for an individual row can be varied, this indicates that a first row of pixels representing the image integration for a shorter integration time, and a second row of pixels representing the image integration for a longer integration time (Column 5, Line 31 through Column 6, Line 20). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the device in Komiya et al. by the teaching of Koch et al. in order to provide an image sensor in which the integration time is controllable in small steps over a large control range so that very precise regulation of the output signals of the image sensor can be attained (Column 1, Lines 42-45).

Regarding claim 5, Komiya et al. discloses the reading out comprises reading out the pixels into a first buffer representing the shorter integration time, and reading out the pixels into

a second buffer representing the longer integration time (the signals of both integration times are read into frame memory 54, Figure 20).

Regarding claim 6, Komiya et al. discloses the pixels are non-destructively read out (nondestructive read imaging element, Column 14, Lines 56-68), and said reading out comprises reading out the pixels first at said shorter integration time and second at said longer integration time (Column 4, Lines 43-66; Column 5, Line 31 through Column 6, Line 20).

Regarding claim 7, Komiya et al. discloses the reading out comprises reading out the pixels from the shorter integration time into the same buffer (frame memory 54, Figure 20).

Regarding claim 8, Koch et al. discloses the readout operation is repeated row by row, within the row duration tzz (Column 4, Lines 43-66), and the length of the integration time tI for an individual row can be varied (Column 5, Line 31 through Column 6, Line 20), this indicates comprising reading out a third row of the pixels representing information at a third integration time.

Regarding claim 9, Komiya et al. and Koch et al. fail to specifically disclose said pixels are active pixels. However, Official Notice is taken that it is well known in the art to use active pixels in an active pixel type CMOS imager. Therefore, it would have been obvious to use active pixels in the imager of Komiya et al. and Koch et al. in order to place an amplifier in each pixel, this results in lower noise level.

10. Claims 10-13, 15-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koch et al. (US 4,589,024) in view of Komiya et al. (US 5,264,940).

Regarding claim 10, Koch et al. discloses a method, comprising:

allowing an array of pixels to receive light representing an image to be detected (two dimensional image sensor, Figure 1, Column 2, Lines 42-60);

reading two separated rows of pixels in each single row readout process wherein said reading reads an entire row at each reading time (The readout operation is repeated row by row, within the row duration tzz, Column 4, Lines 43-66).

Koch et al. fails to specifically disclose to produce two different readout signals with different integration times for each pixel in a single frame readout, and resetting each pixel after each readout of the pixel. However, Komiya et al. teaches an image sensing apparatus having exposure level and dynamic range control circuit, in which a period of time t1 (an integration time, Figure 21) and a period of time t2, (another integration time, Figure 21). And Komiya et al. discloses that after reading out signal at the end of period of time t2, a pixel is reset (Figure 21, Column 15, Lines 4-6). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the device of Koch et al. by the teaching of Komiya et al. in order to prevent the data from lost when reading out data (Column 15, Lines 1-4).

Regarding claim 11, Koch et al. discloses a method, comprising:

allowing an array of pixels to receive light representing an image to be detected (two dimensional image sensor, Figure 1, Column 2, Lines 42-60);

in each frame readout, reading two separated rows of pixels in each single row readout process (The readout operation is repeated row by row, within the row duration tzz, Column 4, Lines 43-66), wherein said two separated rows of pixels represent a first row of pixels representing the image integration for a shorter integration time, and a second row of pixels representing the image integration for a longer integration time (Koch et al. discloses that the length of the integration time tI for an individual row can be varied, this indicates that a first row of pixels representing the image integration for a shorter integration time, and a second row of pixels representing the image integration for a longer integration time, Column 5, Line 31 through Column 6, Line 20).

Koch et al. fails to specifically disclose resetting each pixel after each readout of the pixel. However, Komiya et al. teaches an image sensing apparatus having exposure level and dynamic range control circuit, in which after reading out signal at the end of period of time t2, a pixel is reset (Figure 21, Column 15, Lines 4-6). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the device of Koch et al. by the teaching of Komiya et al. in order to prevent the data from lost when reading out data (Column 15, Lines 1-4).

Regarding claim 12, Koch et al. fails to specifically disclose said reading comprises non-destructively reading. However, Komiya et al. teaches a nondestructive readout by a charge modulation device CMD (Column 14, Lines 63-67). Therefore, it would have been obvious to use active pixels in the imager of Koch et al. by the teaching of Komiya et al. in order to prevent the data from lost when reading out data (Column 15, Lines 1-4).

Regarding claim 13, Koch et al. discloses said reading comprises destructively reading (each row is reset by one of transistors RT1-RTz, Figure 1, Column 2, Line 65 – Column 3, Line 10; since the accumulated signals are destroyed by the reset operation, the reading is destructively reading).

Regarding claim 15, Komiya et al. discloses increasing a dynamic range of information obtained from a pixel by combining information from a first pixel with a first integration time and information from said first pixel with a second integration time (the read-out data is the signal obtained from the exposure during time interval of T1 + T2, Figure 21, Column 15, Lines 1-6).

Regarding claim 16, Koch et al. discloses reading a third row of pixels during each row readout process (The readout operation is repeated row by row, within the row duration tzz, Column 4, Lines 43-66).

Regarding claim 17, Koch et al. and Komiya et al. fail to specifically disclose carrying out correlated double sampling as part of said reading. However, Official Notice is taken that it is well known in the art to include a correlated double sampling circuit in reading out signal from an image sensor to reduce noise of the electric signal. It would have been obvious to one of ordinary skill in the art at the time the invention was made to include a correlated double sampling circuit into the device of Koch et al. and Komiya et al. in order to reduce noise of the electric signal readout from an image sensor.

Regarding claim 18, Koch et al. discloses reading of each of said rows to a separate storage area (charges accumulated in each rows are transmitted to separate column lines SP1 to SPm before reading out, Column 4, Lines 15-20).

Regarding claim 19, Koch et al. and Komiya et al. fail to specifically disclose said pixels are active pixels. However, Official Notice is taken that it is well known in the art to use active pixels in an active pixel type CMOS imager. Therefore, it would have been obvious to use active pixels in the imager of Koch et al. and Komiya et al. in order to place an amplifier in each pixel, this results in lower noise level.

11. Claims 20-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morimura (US 5,455,621) in view of Komiya et al. (US 5,264,940).

Regarding claim 20, Morimura discloses a system, comprising:

a semiconductor substrate defining a two-dimensional array of pixels (light receiving portion 20, Figure 3, Column 5, Lines 62-67), each of said pixels formed with a photoreceptor portion (photodiode 21, Figure 3) therein, and at least one active readout portion (vertical CCDs 22, Figure 3) therein,

a readout control part, controlling said pixels to allow the pixels to receive light representing an image to be detected, and allowing the pixels to accumulate light for an integration, and to control the pixels to readout information, within each frame readout, from the pixels representative of light reception for a first integration time (period CS1, Figure 2A, Column 5, Line 36 through Column 6, Line 63), and a second integration time (period CL1,

Figure 2A, Column 5, Line 36 through Column 6, Line 63), longer than said first integration time, such that each pixel provides light output integrated over both of said first and second integration times for each pixel within each frame readout (Figure 2A).

Morimura fails to specifically disclose a first integration time staring at a first time and a second integration time also starting at said first time, and wherein the readout control part is configured to reset each pixel after each readout of the pixel. However, Komiya et al. teaches an image sensing apparatus having exposure level and dynamic range control circuit, in which a period of time t1 (first integration time) starts at time "0" (RST on the time axis, Figure 21) and a second period of time (t1+t2) also starts at time "0" (RST on the time axis, Figure 21). And Komiya et al. discloses that after reading out signal at the end of period of time t2, a pixel is reset (Figure 21, Column 15, Lines 4-6). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the device of Morimura by the teaching of Komiya et al. in order to prevent the data from lost when reading out data (Column 15, Lines 1-4).

Regarding claim 21, Morimura discloses in Figure 8A, the readout control part also controls the pixels to accumulate light for a third integration time.

Regarding claim 22, Morimura discloses, in Figure 1, an image information combiner (adder 6), which combines information from the first shorter integration time with information from the second integration time, to produce composite information about the image (Morimura teaches adder 6 for synthesizing the image data accumulated at different time periods).

Regarding claim 23, Morimura discloses, in Figure 20A, a first buffer (S30), on the semiconductor substrate, receiving information indicative of the light integrated for the first integration time (S20), and a second buffer (S70), receiving information indicative of the light integrated for the second integration time (S60).

Regarding claim 24, Morimura discloses, in Figure 3, a buffer (storage portion 23) receiving information indicative of the light integrated for the first integration time and indicative of the light integrated for the second integration time.

Conclusion

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to LUONG T. NGUYEN whose telephone number is (571) 272-7315. The examiner can normally be reached on 7:30AM - 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, DAVID L. OMETZ can be reached on (571) 272-7593. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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04/29/06

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SUPERVISORY PATENT EXAMINER